

US EPA ARCHIVE DOCUMENT

CATALOG DOCUMENTATION
NATIONAL COASTAL ASSESSMENT- NORTHEAST DATABASE
YEAR 2002 STATIONS
SEDIMENT CHEMISTRY DATA: "SEDCHEM"

TABLE OF CONTENTS

1. DATASET IDENTIFICATION
2. INVESTIGATOR INFORMATION
3. DATASET ABSTRACT
4. OBJECTIVES AND INTRODUCTION
5. DATA ACQUISITION AND PROCESSING METHODS
6. DATA MANIPULATIONS
7. DATA DESCRIPTION
8. GEOGRAPHIC AND SPATIAL INFORMATION
9. QUALITY CONTROL AND QUALITY ASSURANCE
10. DATA ACCESS AND DISTRIBUTION
11. REFERENCES
12. TABLE OF ACRONYMS
13. PERSONNEL INFORMATION

1. DATASET IDENTIFICATION

1.1 Title of Catalog document

National Coastal Assessment-Northeast Region Database
Year 2002 Stations
SEDIMENT CHEMISTRY DATA

1.2 Authors of the Catalog entry

John Kiddon, U.S. EPA NHEERL-AED
Harry Buffum, CSC

1.3 Catalog revision date

April 2008

1.4 Dataset name

SEDCHEM

1.5 Task Group

National Coastal Assessment-Northeast

1.6 Dataset identification code

007

1.7 Version

001

1.8 Requested Acknowledgment

EMAP requests that all individuals who download EMAP data acknowledge the source of these data in any reports, papers, or presentations. If you publish these data, please include a statement similar to: "Some or all of the data described in this article were produced by the U. S. Environmental Protection Agency through its Environmental Monitoring and Assessment Program (EMAP)".

2. INVESTIGATOR INFORMATION (for full addresses see Section 13)

2.1 Principal Investigators (NCA Northeast Region)

Donald Cobb, U.S. EPA NHEERL-AED
Walter Galloway, U.S. EPA NHEERL-AED
Stephen Hale, U.S. EPA NHEERL-AED
John Kiddon, U.S. EPA NHEERL-AED
Norman Rubinstein, U.S. EPA NHEERL-AED
Charles Strobel, U.S. EPA NHEERL-AED
Henry Walker, U.S. EPA NHEERL-AED

2.2 Sample Collection Investigators

Donald Cobb, U.S. EPA NHEERL-AED

2.3 Sample Processing Investigators

John Kiddon, U.S. EPA NHEERL-AED

3. DATASET ABSTRACT

3.1 Abstract of the Dataset

The SEDCHEM data file reports the concentrations of chemical contaminants in sediment samples collected in Northeast estuaries sampled during the summer of 2002. Sediment samples were analyzed for 86 chemical constituents, including metals, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and pesticides. One record is presented per analyte. For concentration values smaller than the MDL (non-detects), the result is reported as zero, the method detection limit (MDL) is listed, and the record is flagged; thereby giving the data user options for alternative treatment of non-detects (see Section 4.3).

3.2 Keywords for the Dataset

Sediment contaminants, metals, polynuclear aromatic hydrocarbons, PAH, polychlorinated biphenyls, PCB, pesticides, DDT.

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective

The National Coastal Assessment (NCA) is a national monitoring and assessment program with the primary goal of providing a consistent evaluation of the estuarine condition in U.S. estuaries. It is an initiative of the Environmental Monitoring and Assessment Program (EMAP), and is a partnership of several federal and state environmental agencies, including: EPA's Regions, Office of Research and Development, and Office of Water; state environmental protection agencies in the 24 marine coastal states and Puerto Rico; and the United States Geological Survey (USGS) and the National Oceanic and Atmospheric Agency (NOAA). The NCA program was initiated in 2000, and was initially also known as the Coastal 2000 Program.

Stations were randomly selected using EMAP's probabilistic sampling framework and were sampled once during a summer index period (June to October). A consistent suite of indicators was used to measure conditions in the water, sediment, and in benthic and fish communities. The measured data may be used by the states to meet their reporting requirements under the Clean Water Act, Section 305(b). The data will also be used to generate

a series of national reports characterizing the condition of the Nation's estuaries.

4.2 Dataset Objective

The objective of the sediment chemistry data file is to report the concentrations of chemical contaminants in estuarine sediment samples collected in the northeast NCA program in 2002.

4.3 Dataset Background Discussion

Parameters contained in SEDCHEM data file are listed in Section 4.4. This section provides background information on several of these parameters. The information here pertains to data collected in 2002 in northeastern coastal region, Maine through Delaware.

The NCA suite of analytes measured are the same contaminants measured by EPA's Environmental Monitoring and Assessment Program (EMAP) and NOAA's National Status and Trends program. Four classes of analytes are measured: polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), organo-chlorine pesticides, and metals. The twenty-two measured PAHs compounds include the 16 priority pollutants defined by the Superfund program and several alkylated derivatives which are useful in identifying sources of these compounds. The concentrations of 20 PCBs and 20 pesticides, all Superfund priority pollutants, are also measured. Sediment grain-size and Total Organic Carbon (TOC) measurements made on the same sediments are reported in the SEDGRAIN file.

The analytes in this file are identified with an abbreviated code name (listed in Section 7.1.3). Full chemical names are listed in the ANALYTES data table.

Routinely, the concentration values from clean sites were reported as smaller than the method detection limit (MDL). In this file, these 'non-detects' are reported as zero and the QACODE is set to "CHM-A" to indicate the assignment. While the concentration of the analyte is clearly small, it is not strictly zero. The MDL is therefore listed as a guideline to users who wish to substitute values other than zero, i.e., setting the non-detect value to the MDL value, half the MDL value, etc. Furthermore, results of organic analytes may routinely show non-zero values that are less than the MDL. This apparent inconsistency is possible because, by convention, the MDLs for organic analyses are calculated to indicate the threshold of reliable measurements, rather than the stricter limit of instrumental detection. In these cases, the best estimate of the concentration is reported (i.e., the value reported by the analytical laboratory), the QACODE is set to "CHM-B", and the MDL is listed. The user can be confident that the analyte is present, but there is a high degree of uncertainty in the reported concentration. Note that the value of the MDL depends on the dilution history of the sample; therefore, its magnitude can differ widely among samples. Most results in this file are larger than the MDL and are reported directly without MDL values or QACODEs. Finally, records flagged with "CHM-C" indicate that the concentration value is uncertain because an interference was noted in the blank analysis performed with the sample; caution is advised in interpreting these results. To summarize:

<u>QACODE</u>	<u>INTERPRETATION</u>	<u>CONC reported</u>	<u>MDL reported</u>
<none>	result is detectable and > MDL	as measured	<none>
CHM-A	result is \leq MDL and undetectable	zero	MDL is listed
CHM-B	result is \leq MDL but detectable	best estimate	MDL is listed
CHM-C	result may be affected by interference	best estimate	<none>

Samples collected in 2002 were analyzed by one of several analytical labs, identified by the parameter LABCODE in Section 4.4. Participating labs in 2002 were:

LABCODE = NAT_ERI: Environmental Research Institute, University of Connecticut, Storrs, CT 06269-5210.

LABCODE = NAT_GPL: GPL Laboratories, 7210A Corporate Court, Frederick, MD 21703

LABCODE =NY: (NY analyses only) New York Dept of Health Services, Wadsworth Center, Empire State Plaza, Albany, NY 12201

LABCODE = CT(ERI): (Connecticut analyses only) Environmental Research Institute, University of Connecticut, Storrs, CT 06269-5210.

NCA planners provide two alternate locations for a station location in the event that the original location cannot be sampled. The parameter STA_ALT indicates whether the station location was the original site, first alternate, or second alternate—STA_ALT = "A", "B", or "C", respectively. Also refer to discussion in the STATIONS metadata file regarding use of this parameter during analysis of the data.

Massachusetts did not participate in the NCA program in 2002. Rhode Island conducted fish trawls only in 2002, and collected physical water parameters in conjunction with the trawls. Connecticut collected all parameters, but at an abbreviated group of in-shore stations (stations in the Long Island Sound intended for sampling in 2002 were sampled in 2003).

4.4 Summary of Dataset Parameters

* denotes parameters that should be used as key fields when merging data files

*STATION	Station name
*STAT_ALT	Alternate Site Code (A, B, C)
*EVNTDATE	Event date
*ANALYTE	Name of analyte measured. A list of the ANALYTE codes and their full chemical names is presented in the file ANALYTES; also see Section 7.1.3.
CONC	Concentration of analyte. Results fall into one of three categories: 1) the analyte concentration was large and reliably reported; 2) the analyte concentration was less than the method detection limit, but the best estimate of the concentration is reported; and 3) and the analyte was not detected and is reported as zero. See Section 4.3 for further discussion.
CHMUNITS	Concentration units used to report results, reported as the mass of analyte per dry mass of sediment:
	Metals ug/g (ppm)
	PAHs, PCBs, Pesticides ng/g (ppb)

MDL Method Detection Limit; reported only when measured concentration is < MDL (see Section 4.3)

QACODE QA/QC codes:

 <blank> CONC > MDL; concentration value is reliable

 CHM-A CONC is undetectable; value set to zero (user may wish to substitute another value)

 CHM-B CONC ≤ MDL, but is detectable; best estimate reported

 CHM-C failed QA criteria: an interference was noted in the blank analysis performed with the sample; caution is advised in interpreting the result

 See Section 4.3 for further discussion.

LABCODE Code identifying laboratory responsible for performing chemical analyses

 CT(ERI) State laboratory for CT samples only

 NY State laboratory for NY samples only

 NAT_ERI National contract lab (ERI)

 NAT_GPL National contract lab (GPL)

ANALTYPE Code identifying type of analysis

 PEST Pesticides

 PAHs Polynuclear aromatic hydrocarbons

 PCBs Polychlorinated biphenyls

 METALS Metals

5.0 DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition / Field Sampling

The sample collection methods used by USEPA trained field crews will be described here. Any significant variations by NCA partners are noted in Section 5.1.12. Details regarding NCA partners are reported in the STATIONS data file.

5.1.1 Sampling Objective

Sediment sub-samples were collected for the analysis of metallic and organic chemical constituents. Separate sub-samples from the same grab were used for sediment grain-size analyses and toxicity testing. Additional sediment grabs were taken for benthic macrofaunal analysis.

5.1.2 Sample Collection: Methods Summary

Sediment was collected with a 0.04-m² Young-modified Van-Veen grab or similar sampler. Only the top two centimeters of a grab were retained for physical, chemical, and toxicological analyses. A sufficient number of grabs were processed to provide three liters of the 2-cm composite material. The composite was homogenized and separated into two fractions for storage until analysis. One fraction was frozen and used in the measurement of total organic carbon (TOC) and concentrations of chemical contaminants. The second fraction was chilled but not frozen during storage, and was used for grain-size and toxicity analyses. Separate sediment grabs were taken for benthic macrofaunal analysis.

5.1.3 Beginning Sampling Dates

25 June 2002

5.1.4 Ending Sampling Dates

31 October 2002

5.1.5 Sampling Platform

Samples were collected from gasoline or diesel powered boats, 18 to 133 feet in length.

5.1.6 Sampling Equipment

A 1/25 m², stainless steel (coated with Kynar), Young-modified Van Veen grab sampler was used to collect sediments.

5.1.7 Manufacturer of Sampling Equipment

Young's Welding, Sandwich, MA

5.1.8 Key Variables

Not applicable

5.1.9 Sample Collection: Methods Calibration

The sampling gear does not require calibration, although it was inspected regularly for damage by mishandling or impact on rocky substrates.

5.1.10 Sample Collection: Quality Control

Care was taken to minimize disturbance to the sediment grabs. Grabs that were incomplete, slumped, less than 7 cm in depth, or comprised chiefly of shelly substrates were discarded. The chance of sampling the same location was minimized by repositioning the boat five meters downstream after three sampling attempts.

5.1.11 Sample Collection: References

Strobel, C.J. 2000. Environmental Monitoring and Assessment Program: Coastal 2000 - Northeast component: field operations manual. Narragansett (RI): U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Atlantic Ecology Division. Report nr EPA/620/R-00/002. 68 p.

5.1.12 Sample Collection: Alternate Methods

Different grab samplers used by NCA partners include the Smith-MacIntyre and Ponar grab samplers.

5.2 Data Preparation and Sample Processing

5.2.1 Sample Processing Objective

Sediment samples were analyzed for total metals, PAHs, PCBs and pesticides.

5.2.2 Sample Processing: Methods Summary

All analyses were performed on samples that were stored frozen. Sediments analyzed for total metals were dried and completely digested in nitric/hydrofluoric acids (acid persulfate for mercury). The analytical methods used to measure analyte concentrations were: cold vapor atomic analysis (AA) for mercury; graphite furnace AA for silver, arsenic, cadmium, lead, antimony, tin and thallium; hydride generation atomic fluorescence for selenium; and optical-emission ionically coupled plasma (ICP) for the remaining metals. For the organic analyses, sediments were extracted using the procedures of NOAA National Status and Trends Program (Lauenstein and Cantillo, 1993). The PAHs were analyzed by gas-chromatography / mass-spectrometry (GC/MS); pesticides and PCBs were analyzed by GC/ECD (electron capture detector).

5.2.3 Sample Processing: Calibration

The analytical instruments were calibrated by standard laboratory procedures including: constructing calibration curves, running blank and spiked quality control samples, and analyzing standard reference materials.

5.2.4 Sample Processing: Quality Control (QC)

Each batch of samples was accompanied by QC analyses consisting of method blanks, matrix spikes, matrix spike duplicates, and standard reference materials (SRMs). In total, approximately 5% of all analyses were QC analyses. Processing quality was considered acceptable if the following criteria were met: blanks were less than three times the minimum detection limit; accuracy, as determined by analysis of certified reference materials, was within 30% for organic analytes and within 15% for inorganic analytes; and precision, as determined by replicate analyses, was within 30% for organic analytes and within 15% for inorganic analytes. Additional specifications and guidelines are presented in U.S. EPA 2001.

5.2.5 Sample Processing: References

Lauenstein, G. G. and A. Y. Cantillo (eds.). 1993. Sampling and analytical methods of the National Status and Trends Program National Benthic Surveillance and Mussel Watch Projects 1984-1992: Comprehensive descriptions of trace organic analytical methods, Volume IV NOAA Technical Memorandum NOS ORCA 71, Silver Spring, MD. 182 pp.

Texas A & M University, Geochemical and Environmental Research Group. 1990. NOAA Status and Trends, Mussel Watch Program, Analytical Methods. Submitted to NOAA. Rockville (MD): U.S. Dept. of Commerce, National Oceanic & Atmospheric Administration, Ocean Assessment Division.

U.S. EPA. 1995. Environmental Monitoring and Assessment Program (EMAP): Laboratory Methods Manual-Estuaries, Volume 1: Biological and Physical Analyses. Narragansett (RI): U.S. Environmental Protection Agency, Office of Research and Development, EPA/620/R-95/008.

U.S. EPA. 2001. Environmental Monitoring and Assessment Program (EMAP): National Coastal Assessment Quality Assurance Project Plan 2001-2004. U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Ecology Division, Gulf Breeze, FL. EPA/620/R-01/002. 189 p

5.2.6 Sample Processing: Alternate Methods

Not applicable

6. DATA ANALYSIS AND MANIPULATIONS

6.1 Name of New or Modified Values

Not applicable

6.2 Data Manipulation Description

Concentrations of metallic analytes smaller than the method detection limit

were reported as zero (see Section 4.3 for details).

7. DATA DESCRIPTION

7.1 Description of Parameters

7.1.1 Components of the Dataset

PARAMETER	TYPE	LENGTH	LABEL
ANALYTE	Char	8	Code for Analyte Measured
CONC	Num	8	Concentration of Analyte in Sample
CHMUNITS	Char	10	Unit of Measure
MDL	Num	8	Method Detection Limit
STATION	Char	9	Station Name
STAT_ALT	Char	1	Station Name
EVNTDATE	Num	8	Event Date
QACODE	Char	10	QA Code(s)
LABCODE	Char	10	Contract/Lab Identifier
ANALTYPE	Char	10	Code for type of analysis

7.1.2 Precision of Reported Values

All values have been rounded to three significant digits.

7.1.3 Minimum and Maximum Value in Dataset (non-zero data)

ID	NAME	Min	Max
Metals			
AG	Silver	0.016	6.7
AL	Aluminum	70.8	79700
AS	Arsenic	0.35	28.3
CD	Cadmium	0.045	13.8
CR	Chromium	0.53	419
CU	Copper	0.56	282
FE	Iron	245	52500
HG	Mercury	0.01	5.3
MN	Manganese	8.09	2430
NI	Nickel	0.43	54.7
PB	Lead	1.51	334
SB	Antimony	0.17	6.66
SE	Selenium	0.1	3.9
SN	Tin	1.26	102
ZN	Zinc	1.19	658

Polynuclear aromatic hydrocarbons (PAHs)

ACENTHE	Acenaphthene	0.02	320
ACENTHY	Acenaphthylene	0.01	490
ANTHRA	Anthracene	0.01	1200
BENANTH	Benz(a)anthracene	0.02	2900
BENAPY	Benz(a)pyrene	0.05	2400
BENZOBFL	Benzo(b)fluoranthene	0.07	3600
BENZOKFL	Benzo(k)fluoranthene	0.02	1220
BENZOP	Benzo(g,h,i)perylene	0.02	1600
BIPHENYL	Biphenyl	0.02	80
CHRYSENE	Chrysene	0.03	3000
DIBENTP	Dibenzothiophene	0.01	280
DIBENZ	Dibenz(a,h)anthracene	0.05	457
DIMETH	2,6-dimethylnaphthalene	0.03	290
FLUORANT	Fluoranthene	0.18	5700
FLUORENE	Fluorene	0.01	470
INDENO	Indeno(1,2,3-c,d)pyrene	0.03	1300
MENAP1	1-methylnaphthalene	0.03	120
MENAP2	2-methylnaphthalene	0.06	170
MEPHEN1	1-methylphenanthrene	0.02	866
NAPH	Naphthalene	0.06	180
PYRENE	Pyrene	0.05	6070
TRIMETH	2,3,5-trimethylnaphthalene	0.08	330

Polychlorinated biphenyls (PCBs)

PCB8	2,4'-dichlorobiphenyl	0.15	67
PCB18	2,2',5-trichlorobiphenyl	0.48	94
PCB28	2,4,4'-trichlorobiphenyl	0.39	210
PCB44	2,2',3,5'-tetrachlorobiphenyl	0.26	120
PCB52	2,2',5,5'-tetrachlorobiphenyl	0.65	160
PCB66	2,3',4,4'-tetrachlorobiphenyl	0.22	190
PCB77	3,3',4,4'-tetrachlorobiphenyl	0	0
PCB77_CO	PCB77 co-elluted with PCB110	0.22	14
PCB101	2,2',4,5,5'-pentachlorobiphenyl	0.39	180
PCB105	2,3,3',4,4'-pentachlorobiphenyl	0.28	66
PCB110	2,3,3',4',6-pentachlorobiphenyl	0.3	120

PCB118	2,3',4,4',5-pentachlorobiphenyl	0.94	11
PCB126	3,3',4,4',5-pentachlorobiphenyl	1.16	19
PCB128	2,2',3,3',4,4'-hexachlorobiphenyl	0.26	14
PCB138	2,2',3,4,4',5'-hexachlorobiphenyl	0.16	100
PCB153	2,2',4,4',5,5'-hexachlorobiphenyl	0.28	81
PCB170	2,2',3,3',4,4',5-heptachlorobiphenyl	0.59	71
PCB180	2,2',3,4,4',5,5'-heptachlorobiphenyl	0.27	56
PCB187	2,2',3,4',5,5',6-heptachlorobiphenyl	0.25	20
PCB195	2,2',3,3',4,4',5,6-octachlorobiphenyl	0.25	4.8
PCB206	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	0.35	6.7
PCB209	2,2',3,3',4,4',5,5',6,6-decachlorobiphenyl	0.28	13
Pesticides			
ALDRIN	Aldrin	0.64	2.09
CISCHL	Alpha-Chlordane	2.74	20
DIELDRIN	Dieldrin	1.4	47
ENDOSUI	Endosulfan I	0.52	0.55
ENDOSUII	Endosulfan II	0.51	9.5
ENDOSULF	Endosulfan Sulfate	1	7.7
ENDRIN	Endrin	0.47	3.5
HEPTACHL	Heptachlor	5	5
HEPTAEPO	Heptachlor	1	7.8
HEXACHL	Hexachlorobenzene	0.15	28
LINDANE	Lindane (gamma-BHC)	0.98	2.84
MIREX	Mirex	0	0
OPDDD	2,4'-DDD	0.27	82
OPDDE	2,4'-DDE	0.5	37
OPDDT	2,4'-DDT	0.6	0.6
PPDDD	4,4'-DDD	0.2	360
PPDDE	4,4'-DDE	0.23	230
PPDDT	4,4'-DDT	0.5	90
TNONCHL	Trans-Nonachlor	0.43	2

7.1.4 Maximum Value in Dataset

See Section 7.1.3

7.2 Data Record Example

7.2.1 Column Names for Example Records

station	stat_alt	evntdate	analyte	conc	qacode	mdl	chmunits	labcode	analyte
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7.2.2 Example Data Records

CT02-0200	A	9/18/2002	ACENTHE	0	CHM-A	16	ng/g	CT (ERI)	PAHs
CT02-0200	A	9/18/2002	ACENTHY	0	CHM-A	16	ng/g	CT (ERI)	PAHs

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude (Westernmost)

-75.6977 decimal degrees

8.2 Maximum Longitude (Easternmost)

-67.0482 decimal degrees

8.3 Minimum Latitude (Southernmost)

38.4739 decimal degrees

8.4 Maximum Latitude (Northernmost)

45.1848 decimal degrees

8.5 Name of Region

The National Coastal Assessment Northeast Region covers the northeastern US coastline from Maine to Delaware

9. QUALITY CONTROL AND QUALITY ASSURANCE

9.1 Measurement Quality Objectives

Measure replicate grain size of samples to within a precision of 10% (see U.S. EPA 2001).

9.2 Data Quality Assurance Procedures

9.3 Actual Measurement Quality

10. DATA ACCESS

10.1 Data Access Procedures

Data can be downloaded from the web

<http://www.epa.gov/emap/nca/html/regions/index.html>

10.2 Data Access Restrictions

None

10.3 Data Access Contact Persons

John Kiddon, U.S. EPA NHEERL-AED, Narragansett, RI

401-782-3034, 401-782-3030 (FAX), kiddon.john@epa.gov

Harry Buffum, Data Manager, CSC, Narragansett, RI
401-782-3183, 401-782-3030 (FAX), buffum.harry@epa.gov

10.4 Dataset Format

ASCII (CSV) and SAS Export files

10.5 Information Concerning Anonymous FTP

Not available

10.6 Information Concerning WWW

No gopher access, see Section 10.1 for WWW access

10.7 EMAP CD-ROM Containing the Dataset

Data not available on CD-ROM

11. REFERENCES

Lauenstein, G. G. and A. Y. Cantillo (eds.). 1993. Sampling and analytical methods of the National Status and Trends Program National Benthic Surveillance and Mussel Watch Projects 1984-1992: Comprehensive descriptions of trace organic analytical methods, Volume IV NOAA Technical Memorandum NOS ORCA 71, Silver Spring, MD. 182 pp.

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12. TABLE OF ACRONYMS

AED	Atlantic Ecology Division
CSC	Computer Sciences Corporation
EMAP	Environmental Monitoring and Assessment Program
EPA	Environmental Protection Agency
MDL	Method Detection Limit
NCA	National Coastal Assessment
ng/g	Nano gram per gram

NHEERL National Health and Environmental Effects Research Laboratory
PAH Polynuclear Aromatic Hydrocarbon
PCB Polychlorinated Biphenyls
ppb parts per billion
ppm parts per million
QA/QC Quality Assurance/Quality Control
SRM Standard Reference Material
TOC Total Organic Carbon
ug/g Micro gram per gram
WWW World Wide Web

13. PERSONNEL INFORMATION

Chuck Audette, Database Analyst
Computer Sciences Corporation
27 Tarzwell Drive, Narragansett, RI 02882-1197
401-782-3092, 401-782-3030 (FAX), audette.chuck@epa.gov

Harry Buffum, Database Manager
Computer Sciences Corporation
27 Tarzwell Drive, Narragansett, RI 02882-1197
401-782-3183, 401-782-3030 (FAX), buffum.harry@epa.gov

Don Cobb, NCA Project Officer
U.S. Environmental Protection Agency, NHEERL-AED
27 Tarzwell Drive, Narragansett, RI 02882-1197
401-782-9616, 401-782-3030 (FAX), cobb.donald@epa.gov

Walter Galloway, NCA Project Officer
U.S. Environmental Protection Agency, NHEERL-AED
27 Tarzwell Drive, Narragansett, RI 02882-1197
401-782-3096, 401-782-3030 (FAX), galloway.walt@epa.gov

Steve Hale, EMAP Information Manager
U.S. Environmental Protection Agency, NHEERL-AED
27 Tarzwell Drive, Narragansett, RI 02882-1197
401-782-3048, 401-782-3030 (FAX), hale.stephen@epa.gov

Melissa Hughes, Data Librarian
Computer Sciences Corporation
27 Tarzwell Drive, Narragansett, RI 02882-1197
401-782-3184, 401-782-3030 (FAX), hughes.melissa@epa.gov

John Kiddon, NCA Analyst and Northeast QA Manager
U.S. Environmental Protection Agency, NHEERL-AED
27 Tarzwell Drive, Narragansett, RI 02882-1197
401-782-3044, 401-782-3030 (FAX), kiddon.john@epa.gov

John Macauley, NCA QA Officer
U.S. Environmental Protection Agency, NHEERL-GED
1 Sabine Island Dr., Gulf Breeze, FL 32561
850-934-9353, macauley.john@epa.gov

Norman Rubinstein, NCA Project Officer
U.S. Environmental Protection Agency, NHEERL-AED
27 Tarzwell Drive, Narragansett, RI 02882-1197

401-782-3045, 401-782-3030 (FAX), rubinstein.norman@epa.gov

Charlie Strobел, AED Analyst and Project Officer
U.S. Environmental Protection Agency, NHEERL-AED
27 Tarzwell Drive, Narragansett, RI 02882-1197
401-782-3180, 401-782-3030 (FAX), strobел.charles@epa.gov

Kevin Summers, Acting National NCA Program Director
U.S. Environmental Protection Agency, NHEERL-GED
1 Sabine Island Dr., Gulf Breeze, FL 32561
850-934-9244, summers.kevin@epa.gov

Hal Walker, Northeast NCA Program Director and Analyst
U.S. Environmental Protection Agency, NHEERL-AED
27 Tarzwell Drive, Narragansett, RI 02882-1197
401-782-3007, 401-782-3030 (FAX), walker.henry@epa.gov